tendered by L. Field – taken as response to QoNs.
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Professor Les Field, Dep Vice Chancellor (Research) (Submission 10)
Professor Bob Clark
Professor Michelle Simmons, University of NSW
11:15am to 12:00pm

1). Your submission notes that nanotechnology is an incredibly broad subject area that covers an incredible number of fields of application. You, like others, have recommended that discussions or recommendations must focus on the different risks and benefits of specific applications.

Could you expand on that comment? And can you draw a distinction between the various research projects being undertaken at UNSW from other nanotechnology applications that have given rise to public concern?

- Nanotechnology is a broad "catch-all" term that deals with anything on the nanometre dimension scale (about one millionth of a millimetre). So this includes microelectronics, computer memories, fine particulates and powders, particles suspended in solution, viruses, coatings, the components of new plastics and new materials
- The areas that nanotechnology encompass include medicine, engineering, material science. It really is difficult to find generic recommendations that cover all of "nanotechnology" when this term is so broad.
    - You must look at issues on a case by case basis.
    - In some cases there may be an acute health risk
    - In some cases it may be environmental impact – difficulty of containment or persistence
- Most of the public concern is that nano-things can't be seen and they are typically technically difficult to understand
    - there is a fear of lack of OHS standards in the workplace, maybe use of new industrial materials in weapons or terrorism and industrial pollution.
- Nanotechnology that we are developing at UNSW is no different to anywhere else. We are skilled/trained professionals in dealing with all new developments (whether they are nano- or not).
- As one example UNSW conducts a lot of semiconductor research:
    - this is an established research field, where there are 2 potential issues:

        - the products of our research – better computer chips where there are marginal risks as they are ubiquitous and they have been tried and tested in many environments.
        - The second issue is the environment risk of the fabrication technologies we utilise to achieve our research outcomes, including the use of chemicals in the fabrication process and the instruments to build and observe the devices we make. Again these processes have been around for decades and have been used in industrial processes where there has been strict regulations and extensive environmental testing.
    - The Semiconductor Industry Association who oversees environmental health and safety regulations internationally ranks amongst the top 5 % of durable goods manufacture for safety. There is a world semiconductor council and the safety regulations form the basis of OH&S regulations internationally.
    - The National Industrial Chemicals Notification and Assessment Scheme (NICNAS), the National Occupational Health and Safety Commissions (NOHSC), and the Therapeutic Goods Administration (TGA), suitably reinforced in line with the recommendations from the National Nanotechnology Strategy Task Force, form an overarching regulatory framework to address public concerns and professional practice.

2). Do your research projects consider potential health safety and environmental issues relating to their potential commercial applications?

- Absolutely yes – but nano-research is treated no differently to any other area of research
- Each research area is considered on a case by case basis against the risks which are appropriate for that program
- It is difficult to predict where any new development will eventually find applications
    - Technology often finds its widest application in areas which are completely removed from the applications for which it was initially developed.

- Unanticipated consequences are as likely to be positive as negative: for example more powerful computing will potentially bring massive benefit as we will start to understand how the global climate system operates, aid drug design and modelling of biological systems and diseases.

3). Your submission argues that research, science, industry and technology do not fit well within the current structure of the NSW Government. To that end you make three related recommendations – a dedicated Ministry, a Chief Scientist and a long-term strategic plan for research infrastructure.

In making these recommendations you make reference to the approach taken by other State Government. Could you expand on your proposals and in doing so, possibly give some examples demonstrating how NSW has been comparatively disadvantaged?

- At present, we do not have a dedicated State Government Ministry concerned with Innovation, Industry and Research
  - There is no minister or Department that has as part of its key performance indicators to actively build R&D in NSW or to engage with the research institutes to support R&D activities.
- State priorities are not well articulated and we are not well positioned in terms of plans to tackle big issues of importance to the NSW
  - Climate change, water management, energy supply, environmental sustainability, security, pollution, impact of drugs etc etc
- Research is by its nature a long term process that requires someone responsible to oversee the whole range of possibilities and understand the issues/needs involved. Strategic thinking and long term planning of research and development are essential to future economic development.

- As examples of how we have been disadvantaged
  - The NCRIS program for attracting major infrastructure to NSW. Other states were proactive and aggressive in trying to attract major infrastructure strategically into areas which they considered important for the future.

- Major research centres and initiatives – eg Water Research SA has positioned itself strongly by investing significantly. While NSW arguably has the advantage in terms of research credentials and the critical mass of research activity, SA will establish a major centre and their commitment will leverage federal support.
- Victoria stole the agenda on Synchrotron Science.
- Victoria & Queensland have invested heavily in supporting Biotechnology and Biomedical Sciences. They now take the lion's share of Federal NHMRC funding.
- In every major bid for Research Centres, concentrations of major infrastructure, a solid business/strategic plan must show how this will be supported by the State. This needs to be solid support up front. Conditional support makes a weak case.
- Ability to attract outstanding researchers and new faculty appointments. Other states have Fellowships eg. the Smart State Fellowships and research funding for early career researchers to establish new research areas. Whenever we compete for people the overall package in other states can be more competitive. Note UQ gets as much from its state government as all universities in NSW (from the DEST web site http://www.dest.gov.au/sectors/higher_education/publications_resources/profiles/finance_2006_stats.htm)
- As a proportion of the state economy, state government funding for university research in NSW is less than half that in other states. Despite many world class institutes and researchers, we are not capitalising on our ability to attract and conduct outstanding research and progress this to industrial development.

4). Notwithstanding your view that NSW has not best positioned itself to be the preferred location for research, industry, science, technology and innovation, you do note that UNSW is leading the nation in many areas of research including nanotechnology. We have to ask how have you managed this despite the fault in the current government structure?

- NSW is home to many absolutely world-class institutes, research groups and individual researchers. We do get on with our work and naturally attract the accolades associated with research excellence.

- We would be a lot more successful if we were working within a State Government framework which had a clearly articulated plan/agenda/commitment where we could place our research effort in context.
- For example: State govt support has helped bring COEs into the state and sustain the commonwealth's belief in what we are doing. More state involvement would mean a long term future of this investment leading to potential higher economic benefit. It raises the profile of Centres as both a NSW initiative as well as a national initiative.

5). In their submission the University of Wollongong has suggested that NSW would be best served by selecting particular niche nanotechnologies to support through research and commercialisation. Do you agree with this suggestion?

- It is always a good strategy to
    - (i) identify what you do best and focus on those activities and do them properly; and
    - (ii) identify areas that are strategically important for the present and future and build capacity and strength.
- The state government shouldn't select niche technologies – it should identify its strongest researchers in nanotechnology and support the strength and excellence.